West Arctic Outlook

West Arctic Outlook

- Getting Started
  - Create a West Arctic Outlook folder. Use a Red pocket folder and label the front cover with the appropriate year.
  - Locate last year's folder and the West Arctic resource folder.
  - Place a copy of last year's outlook and Severity Ranking table in the new folder.

West Arctic Outlook

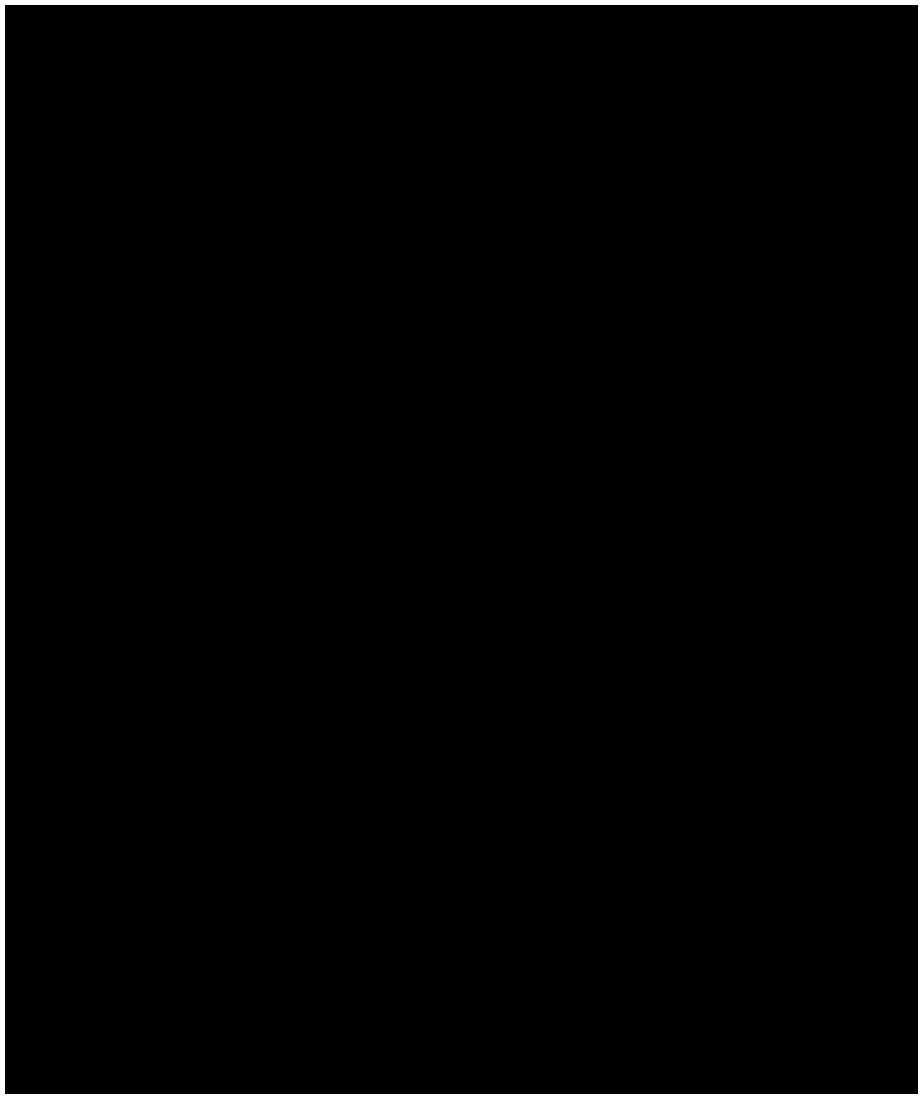

TABLE 1

SELECTED SEA ICE DATA AND SEVERITY INDEX FOR THE NORTH COAST OF ALASKA 1953-1998

SEVERITY		1	2	3	4	5	6	7	8
RANK	YEAR	nmi	nmi	nmi	nmi	date	date	#days	#da
LDEST---------1	1958	50	150	50	210	07/19	10/25	92	99+
2	1968	25	165	30	200	07/19	10/18	86	91
3	1998	15	105	20	240	07/15	10/21	72	100
4	1993	0	130	5	185	07/18	11/07	64	112
5	1962	25	150	30	150	07/19	09/30	49+	68+
6	1973	5	80	5	190	07/31	10/20	73	82
7	1954	20	115	20	210	08/01	09/30	38+	61+
8	1997	28	150	40	150	08/08	10/10	47	63
9	1963	5	130	5	130	08/13	10/18	67	67
10	1990	0	90	40	90	07/23	10/12	75	105
11	1961	15	105	15	135	07/25	09/24	49+	62+
12	1996	10	65	70	155	07/16	09/25	37	71
13	1979	0	125	0	125	08/04	10/08	31	56
14	1989	10	70	55	110	07/19	10/22	34	95
15	1974	10	100	10	100	08/06	10/05	35	61
16	1978	5	70	30	95	07/25	10/09	35	76
17	1986	10	80	10	110	07/29	10/21	30	58
18	1977	5	55	25	85	08/02	10/15	63	74
19	1959	20	65	20	65	07/19	10/06	42	86
20	1995	30	30	50	50	07/15	10/17	70	94
21	1972	0	60	30	90	07/31	10/01	45	63
22	1982	0	85	0	95	08/03	10/10	21	69
23	1994	10	35	10	60	08/05	09/24	44	55
24	1957	5	45	70	60	08/01	10/06	18	67
25	1987	0	10	0	85	08/05	10/30	35	59
26	1981	0	0	35	100	07/26	10/01	0	66+
27	1985	0	35	0	55	08/01	10/15	22	52
28	1967	15	0	30	50	07/25	10/12	UNK	68
29	1984	0	25	0	50	08/11	10/15	21	42
30	1966	5	0	5	45	08/01	10/22	24	65
31	1992	15	0	15	75	08/09	09/19	24	37
32	1965	0	10	0	70+	08/25	09/25	25	32
33	1980	15	25	15	25	08/05	09/30	11	42
34	1953	0	0	5	35	07/27	09/16	5	52+
35	1976	0	15	0	15	08/15	10/07	21	53
36	1971	0	0	0	30	08/23	11/01	8	71
37	1991	0	0	0	20	08/16	10/02	0	46
38	1960	0	0	20+	20	08/05	09/07	0	34
39	1988	0	0	0	25	08/09	09/20	0	32
40	1964	0	0	0	5	08/13	09/20	0	39
41	1983	0	10	0	10	08/08	09/16	0	21
42	1970	0	0	5	0	08/06	09/14	0	32
43	1956	0	0	0	40	09/07	09/30	0	24
44	1969	0	0	0	30	09/07	09/18	5	12
45	1955	0	0	5	15	09/13	09/24	0	12
ST SEVERE----46	1975	5	0	5	0	NEVER	NEVER	0	0

West Arctic Outlook

- Background Materials
  - Collect the end of the month daily cumulative average Pressure summaries, and Theoretical Thickness summaries for January to May.
  - retrieve the average monthly temperature data from NWS Alaska.
  - Make copies of the two ice thickness graphs found in the resource folder. The two stations featured are Point Barrow, and Barter Island.
  - Obtain a blank data collection sheet from the resource folder.
  - Download the 30 day 700 Mb chart from NWS.

West Arctic Outlook

- Forecasting techniques used in the West Arctic Outlook.
  - Objective Statistical Method
  - Barnett Method
  - Analog Method
  - Cycle Method
  - Theoretical Thickness
  - Alaska Temperature data
  - NWS 700 Mb Prog. and Prog. Anomaly

West Arctic Outlook

- Objective Statistical Method
  - Sf = 483.75 + .65x
  - x = 6.29t + 26.58u - 6.78v - 1.11w
  - t = p1+p2+p3+p4-p5-p6-2000
  - u = p17-p18
  - v = p5+p6+p7+p8+p9+p10+p11+p12-p13-p14-p15-p16-4000
  - w = 2*h1+h2-h3

West Arctic Outlook

- Objective Statistical Method
  - Fill in the Data Collection Sheet with the pressure values found on the Daily Cumulative Averages form the end of the months, January through April.
  - Plug the values from the Data collection Sheet into the Objective Statistical Equations.
  - Solve for the Severity Forecast (Sf) and compare you answer to the Severity Ranking.

Data Collection Sheet

GRID POINT	JAN	FEB	MAR	APR		
20°N 20°W	p_1 ———	p_2 ———	*	*		
25°N 40°W	p_3 ———	p_4 ———	*	*		
40°N 160°W	p_5 ———	p_6 ———	p_7 ———	p_8 ———		
65°N 180°W	p_9 ———	p_{10} ———	p_{11} ———	p_{12} ———		
65°N 160°W	p_{13} ———	p_{14} ———	p_{15} ———	p_{16} ———		
75°N 130°W	*	*	*	p_{17} ———		
65°N 80°W	*	*	*	p_{18} ———		
52°N 100°E	*	*	*	h_1 ———	p_{19} ———	t_1 ———
70°N 140°E	*	*	*	h_2 ———	p_{20} ———	t_2 ———
70°N 130°W	*	*	*	h_3 ———	p_{21} ———	t_3 ———

~~Enclosure (9)~~
Appendix (5)

FROM: FLENUMMETOCCEN MONTEREY CA
TO: NAVAL ICE CENTER
4251 SUITLAND ROAD
WASHINGTON DC 20395

SUBJ. DATA REQUIREMENT FOR WESTERN ARCTIC SEASONAL OUTLOOK

DAILY CUMULATIVE AVERAGES FOR DTG 99043001

SURFACE PRESSURE (MB) 30 DAYS

LATITUDE	LONGITUDE	TODAY	CUMULATIVE
52.0N	150.0E	1019.87	1018.42
70.0N	140.0E	1002.30	1016.44
70.0N	130.0W	1029.18	1019.20
55.0N	80.0W	1032.40	1021.57
40.0N	150.0W	1028.14	1023.56
65.0N	180.0E	986.64	1014.28
65.0N	150.0W	1022.73	1016.54
75.0N	130.0W	1036.52	1022.42
20.0N	20.0W	1016.45	1019.36
25.0N	40.0W	1021.47	1020.70

AIR TEMPERATURE (DEG C) 30 DAYS

LATITUDE	LONGITUDE	TODAY	CUMULATIVE
52.0N	150.0E	6.83	6.98
70.0N	140.0E	13.40	16.16
70.0N	130.0W	-7.18	-11.35
65.0N	80.0W	-9.59	-6.93
40.0N	150.0W	7.90	11.64
65.0N	180.0E	-3.86	-10.58
65.0N	150.0W	3.87	-4.94
75.0N	130.0W	-14.52	-18.65
20.0N	20.0W	19.55	21.66
25.0N	40.0W	22.62	21.51

1000 MB HEIGHT (M) 30 DAYS

LATITUDE	LONGITUDE	TODAY	CUMULATIVE
52.0N	150.0E	161.15	148.11
70.0N	140.0E	17.49	103.34
70.0N	130.0W	303.83	145.29
65.0N	80.0W	245.50	165.69
40.0N	150.0W	328.24	193.55
65.0N	180.0E	-113.98	108.69
65.0N	150.0W	22.38	79.74
75.0N	130.0W	270.98	165.11
20.0N	20.0W	139.71	152.95
25.0N	40.0W	182.61	176.64

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CUMAVE

West Arctic Outlook

- Objective Statistical Methods
  - Alternate forecast method
    - Calculate columns 1-8 in Table 1 of the West Arctic Outlook individually using regression equations list on the handout.

West Arctic Outlook

- Barnett Method
  - Primary Method
    - A+B or h1+h2 on the Data Collection Sheet.
    - Great than or equal to 290 unfavorable ice conditions.
    - Less than 290 favorable ice conditions.
  - Secondary Method
    - C-A or h3-h1 on the Data Collection Sheet.
    - Great than or equal to -10 is favorable.
    - Less than -10 is unfavorable

Favorable = light ice conditions

West Arctic Outlook

- Barnett Method, Theoretical Basis
  - April is the transition month between strong winter Siberian high and lower atmospheric pressures of spring/summer.
  - Sum of April 1000 Mb heights is the measure of the timing of the seasonal breakdown of the Siberian high.

West Arctic Outlook

- Analog Method
  - Compare like ice conditions of current Barents East and West, Cook inlet, and Kamchatka Peninsula charts.
  - Find a couple historical Years that best represent the current ice regime.

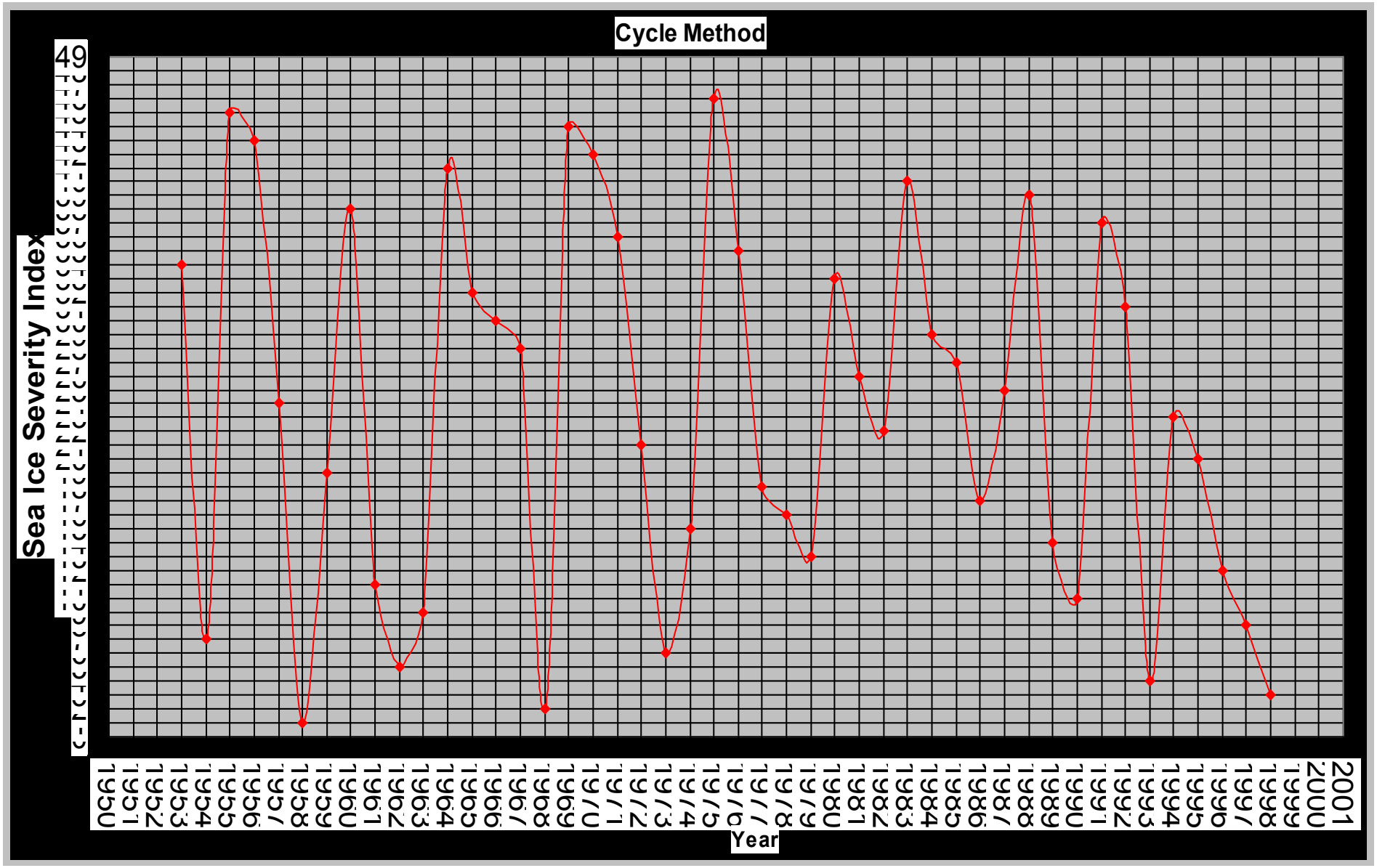
West Arctic Outlook

- Selecting an Analog year
  - How much ice is in Bristol Bay
  - Were does the ice edge fall as compared to the position of St. Paul and St. George Islands.
  - Weakness around St. Lawrence Island and in Norton Sound.
  - How much ice is along the Kamchatka Peninsula.

West Arctic outlook

- Cycle method
  - 1953-1998 graph that displays the severity Index for each year.
  - Looking for trends
  - following every peak is 2 to 4 transition years to a valley. So far no more than 4 years of decreasing severity.

West Arctic Outlook



West Arctic Outlook

- Theoretical Thickness Graphs
  - Use the photocopied graphs of maximum, mean, and minimum thickness to plot the last couple of end of month reports.
  - Compare this years curve to the climatological lines on the graph.

Figure 47A Barter Island Frost-Degree-Day Curves

1957

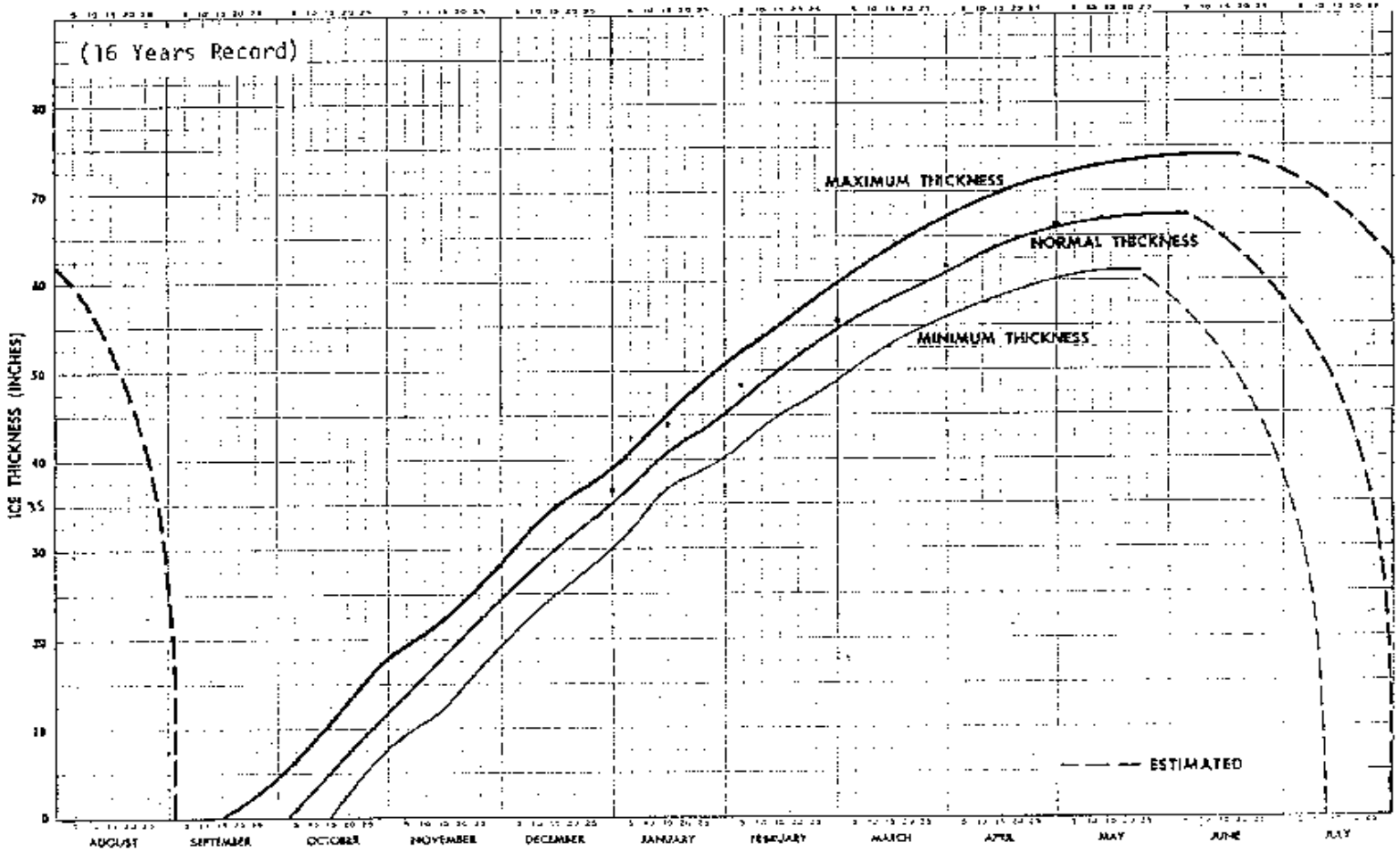


FIGURE 47B BARTER ISLAND THEORETICAL ICE-GROWTH AND ESTIMATED DISINTEGRATION CURVES

West Arctic Outlook

- Alaskan Temperature Data
  - Use the average monthly temperatures from Alaska NWS office to get a feel for the trend in temperature.
  - The date should consist of monthly average temperatures for selected Alaskan stations with their normal, max, and min.
  - Has it been a cold/warm winter?
  - Has the spring been cold/warm?

West Arctic Outlook

- Summary Sheet
  - As you complete a method or indicator write down your thoughts on a note page.
  - At the end summarize all your finding in a paragraph on the summary page.
  - Make your preliminary forecast, and select a range in the severity Index were you think the outlook should fall.
  - prepare to go to Canada.

Summary - 1996:

All of the factors taken into consideration lead the forecaster to conclude that 1996 will be a mild year in the upper one third of severity graph except for the Barnett Practical Method. Since 1993 was such a good fit with 1996 in the analog method and since the Practical Method also erred in 1993, I have decided to discount this one anomaly and forecast a mild year which will place from position 8 - 12 in the severity index.

Summary - 1997:

All of the factors taken into consideration lead the forecaster to conclude that 1997 will be a near normal year. We have selected 1982 as the more likely of the analog years to follow. In this year, the ice season was generally good but a tendency for ice to pile up near Point Barrow corresponds to one meteorological scenario shown in the NWS long range forecasts. The temperature, theoretical ice thickness, objective method and Barnett method all show an average to slightly mild year. Based on the above factors, I have decided to forecast a just slightly milder year than normal which will place 1997 from position 19-23 with the median year being number 22 in the severity index. We came to the conclusion that there is no analog year for 1997. The Canadians brought up the point that the heavy old ice pack was very near the coast near Barter Island and that this presented the possibility of having this ice blown back along the coast in a very short time.

Summary - 1998:

The results from the statistical forecast (SF) were 548. This result standing alone would make 1998 the 4thth mildest year of 46 years. The Barnett Method result was 243. Results above 290 indicate favorable or mild years and results below that threshold indicate unfavorable or severe years. A score of 290 indicates an average year. This prediction does not correlate well with the objective method. However, the El Nino weather pattern discussed below may have had an effect on this method by causing a very cold winter and a very warm fall and spring. I am tending toward somewhat discounting the Barnett Method. Because the trend could go up or down this year without busting the indicator, the projected position of 1998 on the Cycle Theory graph cannot be looked upon as a positive or negative. On the 700 mb forecast chart valid in the middle of June, the isoheights show warm air advection over the Northern coast of Alaska. This would be indicative of a mild year. The following is a discussion of the weather over the season by the forecaster at Anchorage, AK. *During March, April and May the effect of El Nino lessened and storms began to track up into the Bering Sea. This track allowed for warm air to be pulled up over Alaska, and led to the rapid meltout that has been seen in the eastern part of the Bering Sea. This would also explain why the western Bering Sea is remaining between a mean and a max in ice extent, because the ice is being pulled south on the back-side of these storms.* **This would tend to support the mixed signals from other indicators with easier conditions in the West and more severe in the East. The coincidence of the Objective method, the thicknesses, the temperatures and weather pattern and the 700mb forecast leads me to predict a very mild year in the Western Arctic.**

West Arctic outlook

- Canadian Outlook
  - The West Arctic IS NIC's specialty, as the east is the Canadians.
  - You need to take the lead on the west discussion. Site our various indicators.
  - Find out their Analog year.
  - Find out their Preliminary forecast.
  - CIS forecast's for the eastern Beaufort and Amundsen Gulf south of Banks Island. We prepare our outlook for the Prudhoe Bay region.

West Arctic Outlook

- Producing the Outlook.
  - Incorporate the CIS data into your forecast.
  - Fill in Tables 1 and 2 in the new forecast.
  - Take the dates entered in Table 2 and calculate a severity index using the validation formula. You want to make sure your dates and numbers match your prediction.
  - Use the summary notes to update the introduction. Discuss the methods used in creating the Outlook and any conflicts you had in your data sources.

West Arctic Outlook

- Validation of The Seasonal Ice Severity
  - Observed Ice Severity Rank = Sum of columns 2+4+7+8+5
    - Distance to the Ice Edge (15 September).
    - Distance to the 5/10 concentration boundary (September 15).
    - The number of days route is ice-free
    - The number of days route is < 5/10 Concentration.
    - The number of days between initial opening date and the 1st of October.
    - Update the Severity Index and Table one Selected Sea Ice And Severity Index…etc.